Claims

1. In a hard decision demodulation method of QAM (Quadrature Amplitude Modulation) mode, characterized in that it includes determining in bit unit, a corresponding symbol value from a quadrature phase component value (β) and an in-phase component value (α) of a received signal.

2. The method as claimed in claim 1 characterized in that, the decision method of the first bit of the first type selects one of the received values, i.e. either α or β according to the configuration of constellation point, and determines that output is a or else b, if the value is greater than or equal to 0, wherein α is a receive value of I(a real number portion) channel, β is a receive value of Q(an imaginary number portion) channel, and a and b is any number discriminated from each other.

3. The method as claimed in claim 1 characterized in that, the decision method of the second bit selects one of the received values, i.e. either α or β, and determines that output is a or else b, if $|\Omega|/2^{n-1}$ value is less than or equal to 0, wherein a and b is any number discriminated from each other, n is the size of QAM, i.e. a variable determining 2^{2n} and Ω is the received value selected.

4. The method as claimed in claim 1 characterized in that, the decision method of bit over the third bit of the first and less than n^{th} bit selects one of the received values, i.e. either α or β, and is determined by equation 4 below,

[Equation 4]

If it is $4m-3<|\Omega|2^{n-k+1}\leq 4m-1(m=1,\cdots,2^{k-3})$, then the output of bit number

k(k is an integer greater than 3) is 'a' or else 'b', wherein a and b is any number discriminated from each other, n is the size of QAM, i.e. a variable determining 2^{2n} and Ω is the received value selected.

5. The method as claimed in claim 1 characterized in that, the determination of bit from $n+1^{th}$ to $2n^{th}$ is the same with the method of determining bit from the first to n^{th} corresponding thereto, but is determined by substituting non-selected one of the received values, i.e. either α or β for an input value of the equation.

6. The method as claimed in claim 1 characterized in that the decision method of the first bit of the second type selects one of the received values, i.e. either α or β according to the configuration of the constellation point, and determines that output is a or else b, if the value is less than 0, wherein α is a receive value of I(a real number portion) channel, β is a receive value of Q(an imaginary number portion) channel, and a and b is any number discriminated from each other.

7. The method as claimed in claim 1 characterized in that, the decision method of the second bit uses the received value non-selected in the decision method of the first bit of the second type and determines that output is a or else b, if the value is less than 0, wherein a and b is any number discriminated from each other.

8. The method as claimed in claim 1 characterized in that, the decision method of the third bit of the second type selects one of the received values, i.e. either α or β according to the configuration of the constellation point and then, determines that output is a or else b, if the result of α x β is greater than 0 but $|\Omega|/2^{n-1}$ is greater than or equal to 1 or the result of

$\alpha \times \beta$ is less than 0 but $|\phi|/2^{n-1}$ is greater than or equal to 1, wherein a and b is any number discriminated from each other, n is the size of QAM, i.e. a variable determining 2^{2n}, α is a receive value of I(a real number portion) channel, β is a receive value of Q(an imaginary number portion) channel, Ω is the received value selected and ψ is the received value non-selected.

9. The method as claimed in claim 1 characterized in that, the decision method of the fourth bit of the second type is determined by an equation for switching (determining that output is a or else b, if the result of $\alpha \times \beta$ is greater than 0 but $|\phi|/2^{n-1}$ is greater than or equal to 1 or the result of $\alpha \times \beta$ is less than 0 but $|\Omega|/2^{n-1}$ is greater than or equal to 1) the position of two received values in the decision method of third bit, wherein a and b is any number discriminated from each other, n is the size of QAM, i.e. a variable determining 2^{2n}, α is a receive value of I(a real number portion) channel, β is a receive value of Q(an imaginary number portion) channel, Ω is the received value selected and ψ is the received value non-selected.

10. The method as claimed in claim 1, the decision method of odd number bit over the fifth selects one of the received values, i.e. either α or β according to the configuration of the constellation point and is determined by equation 7 below,

[Equation 7]

The discrimination equation of bit every odd number, i.e. $2q\text{-}1^{th}$ bit (q is an integer greater than 3) over the fifth bit is as follows:

If it is $\alpha * \beta \geq 0$ and $4m\text{-}3 < |\Omega|/2^{n-q+1} \leq 4m\text{-}1(m=1, \ldots, 2^{q-3})$, or $\alpha * \beta < 0$ and $4m\text{-}3 < |\psi|/2^{n-q+1} \leq 4m\text{-}1(m=1, \ldots, 2^{q-3})$, output is ‘a’ or else ‘0’, wherein α is an input value of I channel, β is an input value of Q channel, n is the size of QAM, i.e. a variable

determining 2^{2n}, Ω is the received value selected and ψ is the received value non-selected.

11. The method as claimed in claim1 characterized in that, the decision method of even number bit over the fifth bit selects one of the received values, either α or β according to the configuration of the constellation point and is determined by equation 8 below,

[Equation 8]

The discrimination equation of bit every even number, i.e. $2q^{th}$ bit (q is an integer greater than 3) over the fifth bit is as follows:

If it is $\alpha * \beta \geq 0$ and $4m-3< |\psi|/2^{n-q+1} \leq 4m-1(m=1, \ldots, 2^{q-3})$, or $\alpha * \beta < 0$ and $4m-3< |\Omega|/2^{n-q+1} \leq 4m-1(m=1, \ldots, 2^{q-3})$, output is ‘a’ or else ‘0’, wherein α is an input value of I channel, β is an input value of Q channel, n is the size of QAM, i.e. a variable determining 2^{2n}, Ω is the received value selected and ψ is the received value non-selected.

12. In a hard decision demodulation apparatus of QAM (Quadrature Amplitude Modulation) mode, characterized in that it includes a hard decision determining portion of determining in bit unit, a corresponding symbol value from a quadrature phase component value and an in-phase component value of a received signal.